Requirements Topics and Proposals as discussed at Session #4 of 802.20

High Level Topic List

- **Reference Architecture**
- **Channel Bandwidth**
- **FER**
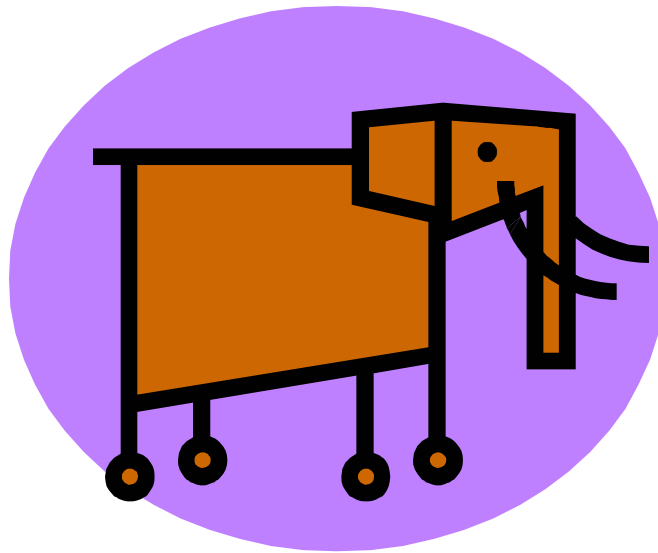- **Sustained Spectral Efficiency**
- **QoS**
- **Multicast**
- **Repeater Delay**
- **Synchronization**
- **OAM**

Approach

How to eat a chocolate elephant …

One bite at a time !

Reference Architecture

Associated Issues

- Need for clear indication that 802.20 follows layered design
- Clear statement that the goal is to allow joint optimized design of MAC and PHY layers to support mobility and antenna technologies, while adhering to above
- Use of an LLC or "Shim Layer" above the MAC to provide full service to layer and/or a switching layer on top of L2
- Relationship to 802 architecture compliance
- Detail sufficient to address FER requirement

Reference Architecture

Most Recent Proposal (2003/9/5 – Mark Klerer e-mail)

- 3.1.1 MBWA System Reference Architecture

  Adopting current communications systems specification principles, 802.20 MBWA systems will be specified using a layered architecture. The 802.20 standards, in conjunction with other 802 standards, will specify the services to be delivered by layers 1 and 2 to an IP based layer 3 or a switching layer, e.g. PPP, MPLS. To facilitate a layered approach, the 802.20 specification shall incorporate a reference partitioning model consisting of the MAC and PHY. This layered approach shall be generally consistent with other IEEE 802 standards and shall remain generally within the scope of other IEEE 802 standards as shown in figures 1 & 2. The 802.20 standards shall also address the needs of logical link control and how and when the 802.2 LLC functionality is used. The 802.20 standards include PHY and MAC layer specifications with a well-defined service interface between the PHY and MAC layer. To provide the best possible performance, the MAC layer design may be optimized for the specific characteristics of the air interface PHY. Figure 2 shows the relationship of various 802 PHY and MAC layer standards to other 802 architectural components. The 802.20 standards shall clarify how 802.20 fits into this architecture.
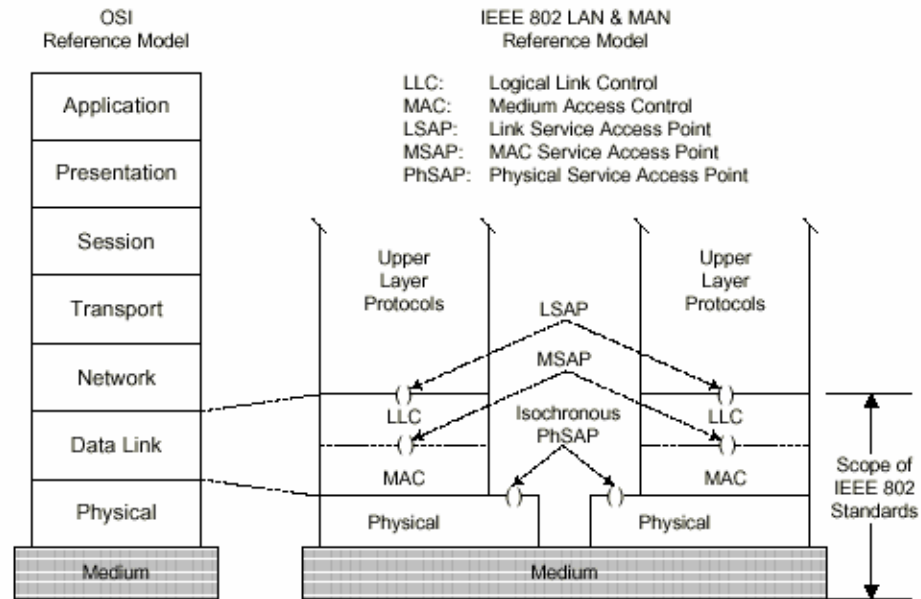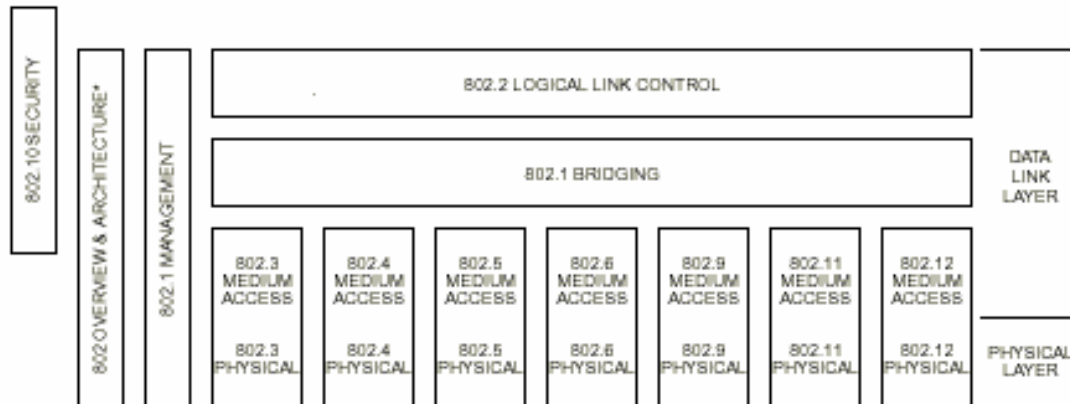
Reference Architecture

Figure 1—IEEE 802 RM for end stations (LAN&MAN/RM)

* Formerly IEEE Std 802.1A.

Channel Bandwidth

Associated Issues

- Desire to work in existing available BW allocations
- Desire to work with larger BW expected to be available in the future
- Requirements for systems beyond 10MHz (2 x 5MHz)
  - Capacity increase for same services
  - New Services
- Availability of Spectrum for 20-40MHz systems
- Power consumption of mobile terminals operating in 40Mhz channels
- Clear specification of TDD/FDD BW
- Relationship to 802.16e effort
- How to document requirements for the MegaBW systems (Defer decision)

Channel Bandwidth

- **Most Recent Proposals (E-mails Wilson, Upton, O'Conner, Cleveland, Trinkwon)**
  - **4.1.4. Support for different block assignments**
  - **The AI shall support deployment of 802.20 systems in the following sized block assignments:**

FDD Assignments	2 x 1.25 MHz 2 x 5 MHz 2 x 10 MHz 2 x 20 MHz
TDD Assignments	2.5 MHZ 5 MHZ 10 MHZ 20 MHz 40 MHz

The individual 802.20 AI proposals may optimize their MAC and PHY designs for specific bandwidth and duplexing schemes.

- **4.1.4 Support for Different Block Assignments**
- **Definition to be added to Appendix A – Terminology**
  - **Block Assignment – A block assignment, which may include paired or unpaired spectrum, is the amount of licensed spectrum assigned to an individual operator.**

FER

- **Associated Issues (C802.20-03/83)**
  - **Do we need to specify it**
  - **If specified relationship to 802**
  - **Application independence**
  - **Simplicity to test**
  - **Relationship of functions to sub-layer model**
  - **Requirements for specific applications in criteria evaluation document or specification of scenarios under which to test and measure FER**
- **Most Recent Proposals (Cleveland C802.20-03/83)) No agreement reached on text change. Deferred for further discussion at CG level.**
  - **The PHY and MAC layers <u>shall</u> be capable of adapting the modulation, coding, FEC and ARQ and power levels to ensure that SDU frame error rates are reduced to a level to meet performance requirements of higher protocol layers (e.g., TCP over IP).**
  - **For a frame error rate of TBD for a 1024 byte SDU frame size delivered to the PhSAP, the probability that a MSDU is not delivered correctly at an MSAP due to the operation of the Physical layer and the MAC protocol, SHALL be less than TBD per octet of MSDU length.**
  - **The PHY and MAC layers MAY operate at higher frame and octet error rates for different applications, such as for decrease latency in real time applications (e.g., VoIP or streaming video).**

Proposed FER Requirement Model (modified)

LSAP

LLC
Sublayer

**Data Link
Layer**

MSAP

MAC
Sublayer

PhSAP

Physical Layer
(FEC)

**PHY
Layer**
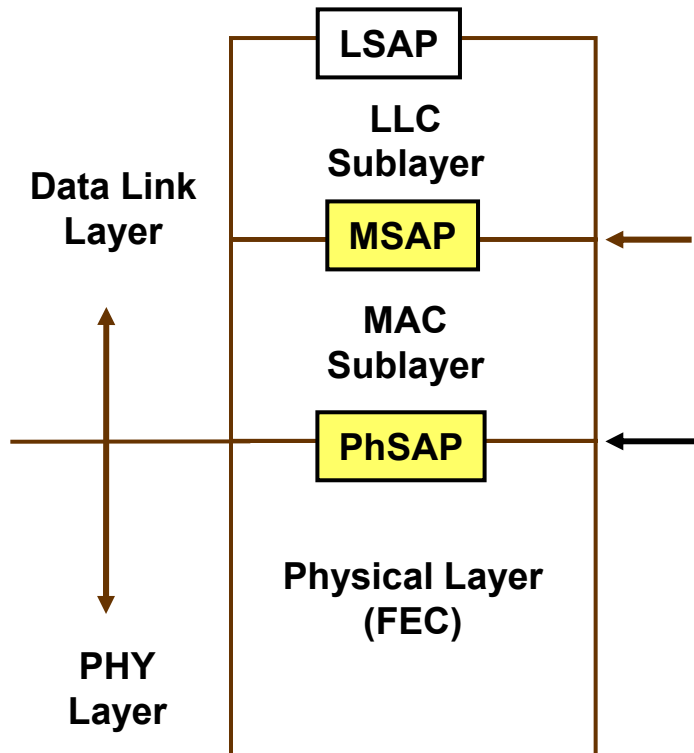
- Specify FER or BER for SDU delivered to MSAP

- Specify FER or BER for SDU delivered to PhSAP

- Require flexibility to disable ARQ or to operate at higher FER or BER for SDU frames

- Give requirements for specific applications in Evaluation Document

Sustained Spectral Efficiency

▤ **Associated Issues**

- **1 bps/Hz/sector vs 2 bps/Hz/sector**

- **Precise definition**

- **Realistic target value as determined by informed opinion on minimum market demands and maximum technological feasibility (*time related*)**

- **Should we look at total appearing on the backhaul per Hz of bandwidth used in the base station**

Multicasting/Broadcasting Requirement

- **Associated Issues**
  - Efficient use of air-interface by allowing use of a single air-link to broadcast/multicast content to all or multiple terminals
- **Proposal (Add to Section 3.1)**
  - The AI <u>shall</u> support broadcast and multicast services

Repeater Support

- **Associated Issues**
  - **Use of repeaters to fill coverage holes**
  - **Use of repeaters to extend range**
  - **Impact of solution on air-interface design**
- **Proposal (New Requirement – (C802.20-03/76))**
  - **The system <u>should</u> support the use of repeaters .**

Synchronization

- 📄 **Associated Issues (C802.20-03/84)**

- 📄 **Proposal (Based on C802.20-03/84)**
  - **The air interface <u>shall</u> support downlink synchronization and uplink synchronization. Synchronization between Base Stations is optional.**

Driving to procedural closure

- Round 1 of iterative requirements development proposed to close in November
- Work towards consensus between now and November on open issues that you believe need to be in round 1.